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The Ministry of Agriculture & the Food and Agriculture
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UTF/SAU/044/SAU



CAMEL CHEESE MAKING WORKSHOP SHORT REPORT

Al-Kharj 13 to 20/04/2014



Dr. Bernard Faye, G. Konuspayeva





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The Camel cheese-making workshop was organized in two steps:

- From 13 to 17th April 2014 with one expert from France (Mrs B. Camier), three participants from foreign countries (Tunisia, Egypt and Dubai), 3 participants from Saudi-Arabia (private sector and University) and 5 participants from the local staff
- On 20th April 2014, one day of demonstration for 6 ladies from different places in Saudi Arabia

Objectives

The objective of this training workshop was to transfer the know-how of the FAO-MOA camel project at Kharj to stakeholders of the camel milk sector in the sub-region. To achieve this goal, local technicians and international experts were mobilized.

General organization

The participants stayed at the same hotel at Kharj and were transported to the center every day. The first day (see final program) after the opening session was devoted to conferences on particularities of the camel milk and on the constraints to make cheese due to these particularities. The 3 other days were entirely devoted to the cheese making with lectures at the end of the day on different aspects of the cheese making (microbiology, degustation methodology, experiences in cheese making in different countries). The last day was devoted to the packaging, then to the presentation of results of the degustation test. A certificate was done at the end of the session. The teachers for the workshop were Benedicte Camier (expert in cheese making at INRA-France) and Dr G. Konuspayeva (biochemist, FAO-KSA).

Another session was organized for one day for ladies in order to teach them for haloumi production. The teachers for this session were Dr Konuspayeva with the assistance of Dr Halima El-Hatmi (Tunisia).

In all the cases, many documents were given to the participants regarding camel milk and cheese making. An evaluation test was distributed to the participants.

Program

Sunday 13th April		
09:00 – 09:30	Registration of participants	
09:30 – 10:00	Welcome speech by Dr Ajulafi (head of Laboratories of the Ministry of Agriculture), by Mr Hassan Dinar on behalf of FAO, by Dr Fuad Alzuraiq (National Project Director) and Dr Bernard Faye (CTA camel project)	
	Presentation of the certificates for the milkers	
10:00 – 10:30	Coffee break	
10:30 – 11:30	Visit of the cheese laboratory and of the camel farm. Control of the quality	N. Alailawi
11:30 – 12:15	Conference: Camel livestock worldwide. Particularity of camel milk production	B. Faye
12:15 – 12:30	Pray	
12:30 – 13:15	Particularities of camel milk. Consequences for camel milk processing	G. Konuspayeva
13:15 – 14:00	Generalities on cheese making. Consequences for camel cheese making processing	B. Camier
14:00 – 15:00	LUNCH Hotel Shamsah	
15:00 – 16:00	Presentations: experiences on camel cheese making in Egypt	Dr Alaa Hamed
Monday 14th April		
08:00 – 10:00	Practical work: Making Halloumi camel cheese	B. Camier, M. Alshumaymiri
10:00 – 10:30	Coffee break	
10:30 – 12:15	Practical work: Making Halloumi camel cheese	B. Camier, M. Alshumaymiri
12:15 – 12:30	Pray	
12:30 – 13:00	Practical work: Making Halloumi camel cheese	B. Camier, M. Alshumaymiri
13:00 – 14:30	LUNCH Hotel Shamsah	
14:30 – 15:30	Practical work: Making Halloumi camel cheese	B. Camier, M. Alshumaymiri
15:30 – 16:00	Conference Learning of microbiology for dairy products	B. Camier
16:00 – 17:00	Presentation of the experiences in Tunisia and Dubai	H. El-Hatmi and C. Thulsiram
Tuesday 15th April		
08:00 – 10:00	Practical work: Making Mozzarella camel cheese	B. Camier, M. Alshumaymiri, G. Konuspayeva
10:00 – 10:30	Coffee break	
10:30 – 12:15	Practical work: Making Mozzarella camel cheese	B. Camier, M. Alshumaymiri, G. Konuspayeva
12:15 – 12:30	Pray	
12:30 – 13:00	Practical work: Making Mozzarella camel cheese	B. Camier, M. Alshumaymiri, G. Konuspayeva
13:00 – 14:30	LUNCH Hotel Shamsah	
14:30 – 15:30	Practical work: Making Mozzarella camel cheese	B. Camier, M. Alshumaymiri, G. Konuspayeva
15:30 – 16:30	Discussion on degustation process	Dr B. Faye
Wednesday 16th April		
08:00 – 10:00	Practical work: Finalizing to make Mozzarella camel cheese. Making pressed cheese Gruyere type	B. Camier, N. Alailawi, G. Konuspayeva
10:00 – 10:30	Coffee break	
10:30 – 12:15	Practical work: Finalizing to make Mozzarella camel cheese. Making pressed cheese Gruyere type	B. Camier, N. Alailawi, G. Konuspayeva
12:15 – 12:30	Pray	
12:30 – 13:00	Practical work: Making pressed cheese Gruyere type	B. Camier, N. Alailawi, G. Konuspayeva
13:00 – 14:30	LUNCH Hotel Shamsah	
14:30 – 15:00	Practical work: Making pressed cheese Gruyere type	B. Camier, N. Alailawi, G. Konuspayeva
15:00 – 16:00	Degustation of the produced cheese (test)	B. Faye, G. Konuspayeva
Thursday 17th April		
09:00 – 10:30	Practical work: Packaging of final products	B. Camier, M. Alshumaymiri, N. Alailawi
10:30 – 11:30	Coffee break	
11:00 – 12:00	Presentation of the results of the degustation test	B. Faye

12:00 – 12:30	Pray	
12:30 – 13:00	Evaluation of the workshop	All participants
13:00-14:00	Closing ceremony – giving certificates	B. Faye, CTA
14:00-15:00	LUNCH Hotel Shamsah	
Sunday 20th April		
8:30 - 9:30	Welcome party of the women and visit of the camel farm	F. Alzuraiq, B. Faye
9:30 - 10:30	Practical work: making haloumi cheese	G. Konuspayeva, H. El-Hatmi
10:30 – 11:00	Coffee-break	
11:00 – 14:00	Practical work: finishing haloumi making	G. Konuspayeva, H. El-Hatmi
14:00 -15:00	LUNCH at Guest-house of the center	

Results regarding the degustation taste of the produced cheese

The degustation involved 3 cheeses including one from supermarket as comparison (cow haloumi). Each cheese was described (texture, moisture, taste, level of salt and smell). A global appreciation was given at the end of the degustation session with a scoring from 1 (excellent) to 5 (bad). The main results showed a good appreciation of the camel haloumi (figure 1) and of camel mozzarella and an appreciation between good and medium for cow haloumi. However, if the appreciation of camel haloumi was homogeneous between tasters (low standard-deviation), it was not the same for mozzarella and overall for cow haloumi where the notes were between 1 and 5!

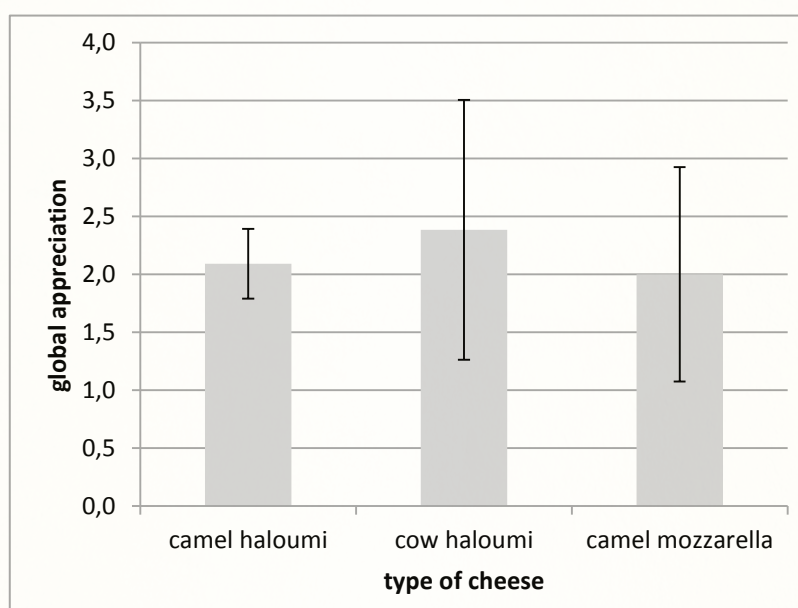


Figure 1. global scoring of the tasted cheeses

There was no difference between Saudi and non-Saudi tasters but there is a tendency of better appreciation by Saudi (2.09 ± 0.92) than by non-Saudi tasters (2.4 ± 0.70). However, we observed a big difference between the cheeses: the Saudi tasters appreciated better camel mozzarella (note 1.4) than camel haloumi (note 2.0) and overall cow haloumi (note 2.6). At reverse, the non-Saudi tasters gave a better note to cow haloumi (note 2.0) than camel haloumi (note 2.3) and overall mozzarella (note 3.0). There was no correlation with the age of the tasters.

After multivariate analyses, the relationships between global appreciation and organoleptic quality were assessed. Globally (see figure 2), the first factor discriminating the cheese is the species, the cow cheese appearing different than the camel cheese. This difference explained 58.4% of the variance. The second factor separated the types of camel cheese but this difference explained 9.7% of the variance only. The global appreciation good is closed to camel haloumi while medium is closed to camel mozzarella cheese, and cow haloumi between good and bad, confirming the mean and standard-deviation observed in the global appreciation (figure 2).

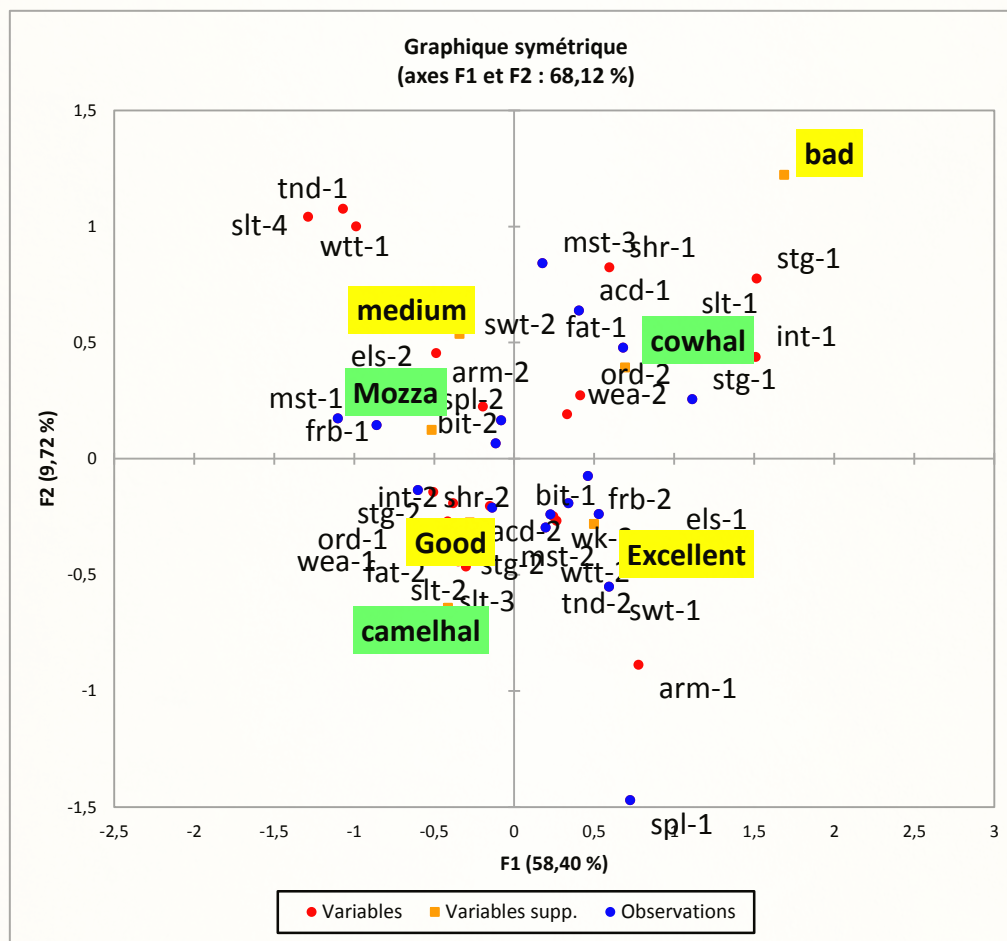


Figure 2. Factorial plan from multivariate analysis

On average, camel haloumi is sweet with a weak or ordinary smell and sufficient salt. Camel mozzarella has a weak and friable texture without smell and rather tender smell but not enough salty and too dry. The cow haloumi is regarded to have a strong texture, acid, fat or sharp taste with intense or strong smell and wet moisture (figure 2). The classification identified 5 types of cheese according to their description but there was no link with the three cheeses analyzed, confirming the heterogeneous appreciation between tasters.

However, the main conclusion of this analysis is that camel cheeses are well appreciated by Saudi consumers.

Evaluation of the workshop

Globally, the workshop was highly appreciated by the participants (table 1). With a scoring from 1 (bad) to 5 (excellent), the global not was 4.7 (excellent). Regarding the different items of the evaluation sheet the highest notes were for the interest (4.9 on average) and the total appreciation (4.9). The lowest scoring was observed for the conferences given (4.3) and the speed of the workshop (4.3). The local staff and people from Saudi Arabia in general were more enthusiastic than the foreigners.

Table 1. Notes for the different items of the workshop attributed by the participants in the men session (scoring from 1 –bad to 5-excellent)

n° participant	Content	Conference	Organization	Pedagogy	Speed	Interest	Total appreciation
n1	5	4	5	4	3	5	4
n2	5	3	4	5	5	5	5
n3	4	5	4	4	4	5	5
n4	5	5	5	5	5	5	5
n5	4	2	5	5	3	4	5
n6	5	5	5	5	5	5	5
n7	5	5	5	4	4	5	5
n8	5	5	5	5	5	5	5
n9	5	5	5	5	5	5	5
MEAN	4.8	4.3	4.8	4.7	4.3	4.9	4.9

The women session was more difficult to organize because the workshop was limited to one-day and the ladies had less technical skill background for integrating all the steps of the process. However, the session was well appreciated, but less than for the men session (table 2). If the organization of the session was highly appreciated (4.2), the content, the conferences and the interest were less noted (3.8). It is remarkable to note that the interest was less noted by the women while it was highly appreciated for men session. The mean note of appreciation was 4.0 (good).

Table 2. Notes for the different items of the workshop attributed by the participants in the women session (scoring from 1 –bad to 5-excellent)

n°	Content	Conference	Organization	Pedagogy	Speed	Interest	Total appreciation
n1	4	3	4	5	5	4	3
n2	4	4	4	4	4	4	4
n4	3	4	4	4	4	3	4
n5	4	4	4	4	4	4	4
n6	4	4	5	4	3	4	5
MEAN	3,8	3,8	4,2	4,2	4,0	3,8	4,0

From the point of view of organizers, the women session had a mixed success. First, the ladies did not show a high interest for cheese-making (two of them refused to taste the cheese. The conditions for working (room at 30°C with 70% humidity) are difficult with the traditional clothes and overall, the cheese processing is difficult without technical background and proper equipment. These women from small-scale unit cannot expect to have such equipment available for implementing this activity. It could be possible only within cooperative having a project for milk processing and ready to invest in the implementation of dairy processing plant.

List of participants

➤ *Men session*

Name	email	Institution	nationality
Benedicte Camier	benedicte.camier@rennes.inra.fr	National Institute on Agronomic Research	France
Alaa Hamed Ibrahim	alaa.drc@gmail.com	Desert Research Center	Egypt
Halima El-Hatmi	Halima.Elhatmi@ira.rnrt.tn	Institute of Arid lands	Tunisia
Tulsiram Chinnakonda	tulsiram@camelicious.ae	Camelicious farm	Dubai
Khalid Bursais	kab2018@hotmail.com	King Faisal University	KSA
Osamah Zakareiah	osama@almazrah.com	Al-Bandariah Dairy Co	KSA
Abobaker alsadeeq	pmmazrah@gmail.com	Al-Bandariah Dairy Co	KSA
Nasser Alailawi	Nas122133@hotmail.com	Camel project Kharj	KSA
Mohammed Al-Shumayri	-	Camel project Kharj	KSA
Khalid Omar Alhammad	Khouled-88@hotmail.com	Camel project Kharj	KSA
Khalid Ali Algruin	Khalid-2011@windslive.com	Camel project Kharj	KSA
Fahad Alshammari	-	Camel project Kharj	KSA
Ahmed Saeed Al-Omari	Al_omary1428@hotmail.com	Camel project Kharj	KSA
Gaukhar Konuspayeva	konuspayevags@hotmail.fr	Camel project Kharj	Kazakhstan
Bernard Faye	faye@cirad.fr	Camel project Kharj	France

In addition, representatives from the ministry of Agriculture and FAO participated to the opening session as well as of the cultural service from the French Embassy (Mr Le-Deaut) and from UBIFRANCE (Mr Bergerot).

➤ **Women session**

Name	Institution	Nationality
Taghareed Abbas Raheem Ahmed	Industrial complex for women. Almadina Almounwara Association	KSA
Afaf Meraysheed Al-Logmani	Industrial complex for women. Almadina Almounwara Association	KSA
Reem Saleem Al-Guhani	Basma association	KSA
Muneira Al-Zedani	Herfa association	KSA
Khadijah bin Soliman Al-Harbi,	Herfa association	KSA
Halima El-Hatmi	Institute of Arid Regions	Tunisia
Gaukhar Konuspayeva	Camel project Kharj	Kazakhstan

The workshop in photos

The opening session: the speeches and the assembly



The delivery of certificates to the milkmen (former training on machine milking)



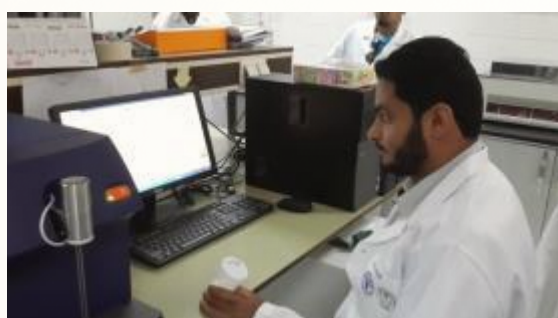
Visit of the camel farm: explanations regarding the lactocorder and meeting with the camels



Visit of the cheese laboratory and degustation



Visit of the biochemist and microbiology laboratories



Practical training sessions (3 days): lectures and cheese making



Degustation test and packaging (last day)



The local team of cheese laboratory



Delivery of the certificates



Women session



Delivery of certificates



List of documents distributed

- The book on “camel biodiversity in Saudi Arabia”
- Brochure on “Saudi camel cheese”
- Brochure on “ machine milking in camel”
- Leaflet on “physiology of lactation in camel”
- Leaflet on “body condition score in camel”
- Notebook on camel cheese making

Conclusion and recommendations

This workshop was a true success both for the participants of the first week and for the local staff of the camel project. Beyond the exchanges between the participants, it contributed to the “team building” and it allowed measuring the advancement of our methodology compared to other present countries. Even the cheese performed by Camelicious farm at Dubaï, the largest camel farm in the world, was inconclusive. Regarding the ladies session, the record was no as conclusive for two main reasons: the weak technical background of the participants and the duration of the session. The promotion of camel cheese making in the future must take in account these constraints.

In consequence, the recommendations could be:

- To organize another workshop for Saudi people only involved in camel milk processing
- To develop our communication on the cheese making from camel milk
- To invest with women cooperatives able and ready to invest in minimal equipment
- To pursue the proper researches on camel milk methodology
- To publish as soon as possible our preliminary results to be the first team having such success

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**Improvement of research for sustainable development of
camel production in the Kingdom of Saudi Arabia
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